

Observation on behavior of adult oriental white stork in nesting period

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Abstract Based on the field observation on the parental behavior of Oriental White Stork (*Ciconia boyciana*) during their brooding period, this paper describes the breeding style, feeding behavior, water chicks, protect chicks, etc. A Ritual "behavior--Culmen Knocking/bill clattering" was observed and which is divided into three styles with deferent meanings. This behavior plays an important role during this season.

Key words: Oriental White Stork, Parent, Brooding period, Behavior, Ritual, Culmen knocking/bill clattering.

Introduction

There are many studies on Oriental White Storks. The study subjects include population, distribution, migration, ecology, historic status and conservation, captive propagation, reproductive biology and behaviors, etc. Kyoko Archibald and Bernard Schmitt (1991) reported the comparison between the Oriental White Stork and the European White Stork. They also described special behaviors of "Clattering" and divided into 3 styles. These are "threat bill clattering", "courtship bill clattering" and "contact bill clattering". They explained the female Oriental White Stork's bill clattering has 3 meanings: initiation, appeasement and contact. In that paper, some of the European White Stork's behaviors were introduced, too. Wu Zhigang *et al* (1991) report hand raising and release of this bird and some of their behaviors. In our study, we observed the same behavior of "Culmen knocking or bill clattering", but there are some differences. The other behaviors like "on-nest change" ritual, breeding, watering, etc. were observed during the nesting period.

Methods

This observation progressed at Momoge Natural Reserve in western Jilin Province, China (about 46°07' N, 123°57' E) from earlier April to end July during years of 1986 and 1987. We observed the storks at 20 m north from the nesting tree by hiding inside a camouflaged shed bounded open one of the farmland banding forest trees, and was 2 m above the ground. Observers using 16# binoculars to observe, using a 800-mm zoom lens to take color photos so that can record their behaviors. Video camera was used as well.

Results

Feeding behaviors

This behavior is changed according to nestlings' day-age increase. Before 8 days old, the parents dropped the foods into nestlings' mouth directly. After that, the adults put the fishes onto the nest and then nestlings peak up themselves. Generally, adults keep the food inside their throat bag (also some cases hold the fishes by bills, roughly 7%). Generally, the adults do not throw up the food immediately to the nest, although the nestlings ask for food with rapid neigh. A special stimulation by nestlings is necessary for the adults to throw up. This usually happened after either the parents' bill touched by nestling's bill or the adult touches nestlings' bill first and then the nestlings do it after. 34 in 36 cases of food omitting were found under this condition and which is 94.4% in the total cases we had recorded. Only 2 of them were difference because the long-time non-feeding caused by human interference. In one case the food was stored inside the adult's throat bag for 3.5 h until the bill-touch stimulation appeared.

The adults throw up the food by 2-5 times so that can manage the amount of food for each nestlings. The feeding time increased with growth of nestlings. Before 10 days old there were 3~4 feedings per day, and it increased to 6~7 per day till 36 days old. It decreased to 1~3 per day just couple of days before leaving out nest. In several days after they leaving out nest, this feeding behavior still was found near the nesting area.

Watering

Adults water nestlings during daily time adjudged according to the weather condition. Through the observation, no watering found before 10 days old since the weather when was warm and the nestlings' activities were rare. After that the adults watering the nestlings twice per day, except it was raining and tem-

perature was low. It can be known when adult brings water back because their bills were moist and reflect light. When watering, the adult allows the water slowly flute into nestlings' mouth. The nestlings, however, rising up their opened bills vertically so that water can flute into their mouth.

Protecting behavior

The reaction to the bad weather

When weather condition was poor, the adults showed strongly protect behavior. They using their wings to shade an awning or even drew water to the nestlings' body to low down body temperature when it was too hot. When it was cloudy, windy or raining, the adults protect their babies with their own bodies. On 24 May, 1987, there was 10-min storm with size of some 1~2 cm hail there, during the storm an adult holds all 4 low aged nestlings under its wings. After raining we observed the nest immediately, and most of the nest was wet through, except roughly 30 cm diameter around area in the middle. The nestlings were completely safe.

Nest protecting behavior

This behavior is very strong for Oriental White Storks. In almost all the cases, one of the parents keeps to active around the nesting area. When researchers clam up to measure on the nest, the parent(s) spiral 50~150 m above the nest with impatience, or one of them keeps to wander pace up and down 100 m away. After people's leave, the adult watches the nest carefully for a while to ensure no danger and then back to nest. And they then showed tender care for each of the nestlings immediately and kept observing the surroundings for about 20 min.

Reinforce nest is found all along with this period. Some times they store the twigs at some where and then peak all together up to the nest.

Reaction to other species

Stork is a large bird and also nests on top of tree. Almost no real threaten is to them. But during brooding time, there still some dangers to the lower aged chicks (i.e. bird of prey). When those of birds flight near by, the adults hide its body lower and cover all nestlings under wings without any voice till the danger is gone.

When there is an unusual voice, the adult usually alarmed to look around and emphasized to the direction where voice was given.

Behavior of tender care and preen for nestlings

The behavior of tender care for nestlings is outstanding during all the brooding period, especially after any disturbance. The parents some times

threatened to leave nest because of the measuring on nest and working close to the nest. Each time they back to nest after those disturbance, they always tuck each the nestlings' head carefully and slowly to show their comfort and care. In some cases the culmens of both adult and nestlings cross together. If nestlings touched adult during they play, the adult always peck the nestlings lightly. It just likes very intimate or teaching.

The adults frequently preen the nestlings and are roughly 15% in the total time spent on the nest. To do this, the adults use their bills preen nestlings' feather follow the order of back, breathe, front neck, etc. After the preen, the nestlings' feather became bright and neat.

Behavior of training nestlings

Observation showed that the adults take basic skill training to their nestlings consciously. During preen they usually showing one movement repeated for several times until nestlings following to imitate. When reinforce nest, the adults take an example to nestlings, then nestlings imitate to follow, peak up twigs and then put it on to nest. That may repeat for more than 10 times. After 30 days old, the adult showing wings spread and flying gestures frequently. Two to three days before the nestlings leaving out nest, the parents keep almost all the time stay at farmland 50~100 m away around nest and observe nestlings' flying practice without backing to nest.

After leaving out nest, the parents begin to teach the immature height rising skill for migration flying. Choosing weak wind and clear day, one of the adult flying just like they do during migration, make a spiral circle up flying with a small diameter (roughly 15~20 m). When the height roughly to 300 m, they landing again near by while the nestlings arise their heads and watch carefully. This behavior usually practiced at a large area of farmland they habit.

"On-nest change Ritual"

"On-nest change ritual" happened most of the time when one of the adults returns to nest from their food searching or other out-nest activities. Both the male and female stand face to face on nest or some time on ground, "Culmen knocking or bill clattering" is usually given by the return one. The sequence of bill clattering is basically as same as described by Kyoko (1991). The stork throws its head vertically upward all the way back until the crown is resting on the back, and then points down till original position. Bill clattering begins second before the bill is thrown upward and ends at bill return to the original point. So its bills (culmen) make a semi-circle by moving its head and bills from up and down with consequently loudly clattering. See Fig. 1.

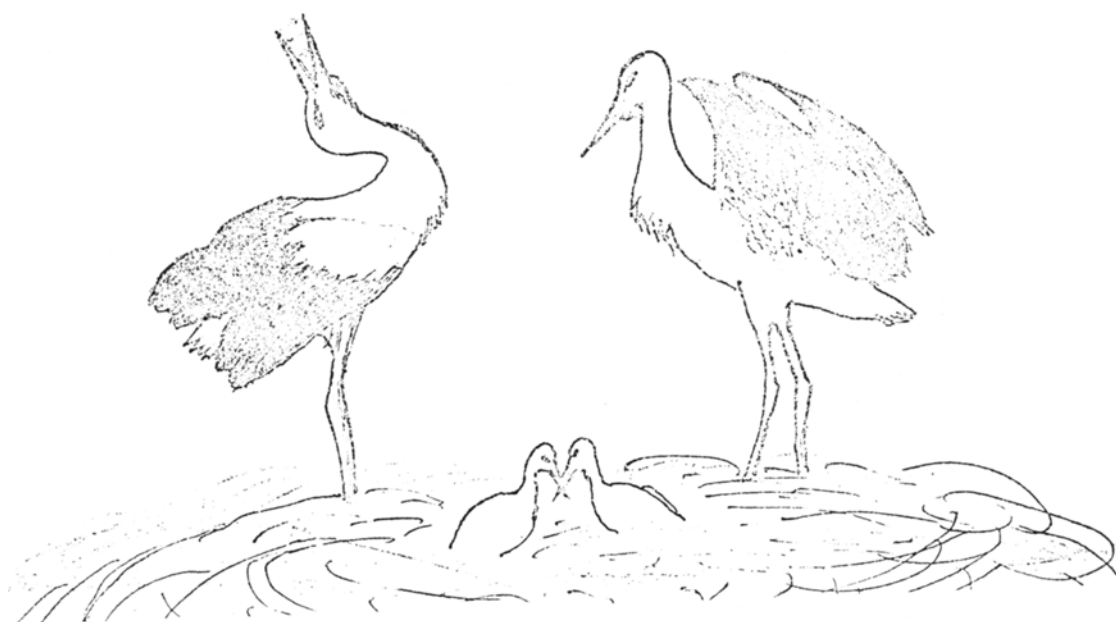


Fig. 1. The "on-nest ritual" and bill Clattering of Oriental White Stocks

By this a loader and continuously sound like da da da ..." will be heard and may last 3-5 seconds. Then the on-nest one will fly to its feed searching direction. This behavior is almost company with all the nesting season. Even for some reason the on-nest one scarred left nest. This process of ritual would still give 100~200 m away on the ground.

Meanings of culmen knocking or bill clattering

The "Bill clattering" was described as above. This behavior is very important during brood period and even all breed season. According to our study, it can categories into 3 meanings of style. See Table 1.

Table 1. Styles of bill clattering and their meanings

Bill Clattering	Sounds	Background	Meaning
Diversion Clattering	Da, Da Da, Da Da Da, Uncontinuous, slow	During rest, leather time	For diversion
Ritual Clattering	Da Da Da Da Da Da ..., Continuous, Mid-speed	During On-nest exchange ritual	For greetings, regards
Calling Clattering	Da Da Da Da Da Da ..., Continuous, Fast	During sponse without return to nest for long time	For contact, calling to return

The first one is we called as "Diversion Style". The clattering frequency is lower and uncontinuous. The sounds like "da, da da, da da da ...". This style was found when rest or intimate with nestlings. It has no special meaning and which with only 7% in total.

The second is "Ritual Style". This style is kind of continuous mid-speed clattering with the highest appear frequency and was found almost all the cases when On-nest change ritual". This behavior took up 86% of total observation, given by returned feed searching one. This clattering meaning is greeting or

regards. It is common and important.

"Calling-contacting Style" is given by on-nest adult with hurried continuous clattering. The sounds is like da da da da..." with frequency of some 8 times /s. It is very important clattering and has very special meaning. Both of the spouses could keep in touch each other in some special cases by this. It usually happened at the cases like that food searching adult landing on the ground far away without back to nest directly, and or do not return for long time. Giving this style of clattering probably be the time separation of feeding nestlings is too long. When nestlings keep to ask for food with chirp after pacification, the adult begins to step impatiently on the nest and sometimes to look around. If the spouse still not returns, the on-nest one would give this clattering. When this happened, the feed searching adult will return to nest in about 1 min and will feed nestlings immediately. So the meaning of this culman knocking style is notify its spouse back to nest quickly.

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